

Natalia Has Another Problem

Natalia has another problem she needs your help with. Do you still have some energies left?

A *Logical String* is a string that represents a valid boolean expression. It is composed of operators AND, OR and NOT and truth values operands. The boolean expressions are recursive in the sense that operators can have other operators as operands. For example, the following is a list of valid *Logical Strings*:

```
T
      T
F
  F
AND(T, T)
OR(T, F)
NOT(T)
AND(OR(T, F), AND(F, F))
AND(AND(AND(OR(T, F), F), F), T)
AND ( AND ( OR ( T,F),OR(F,F)),T)
```

Please note that there can be several spaces in between objects. However, no space will be in between letters of the names. Therefore, "AND(T,T)" is a valid *Logical String* but "A N D(T,T)" is not.

Given a *Logical String*, please evaluate it and output its truth value.

Input

The first line contains T ($1 \leq T \leq 100$), the number of test cases. Then there are T lines. Each line contains a string $s_0s_1s_2\dots s_{n-1}$ ($1 \leq N \leq 100$). It is guaranteed that the i^{th} *Logical String* is valid.

Output

For each *Logical String* given, output its truth value. If it is true, output T, otherwise output F.

Example

Input:

```
7
T
F
AND(T, T)
OR(T, F)
NOT(T)
AND(OR(T, F), AND(F, F))
AND(AND(AND(OR(T, F), F), F), T)
```

Output:

T
F
T
T
F
F
F